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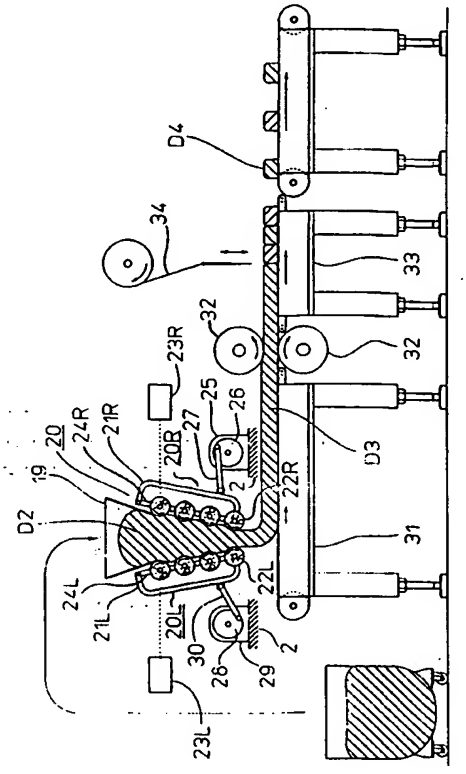
(54) Process of preparing bread

(57) A process for preparing bread, in which fermented dough (D2) receives repeated pressure for stretching, which pressure is given by a pressing means. However, through this process, the network structure of gel is not broken. Thus, a further fermentation step, such as an intermediate fermentation step or a final fermentation step, can be eliminated.

Fig. 2



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Description

[0001] The present invention relates to a process of preparing bread. According to this process, the final proofing step, which has been always performed after the final molding of dough and before baking, can be eliminated. Thus, a simpler process as compared to conventional processes for preparing bread can be provided. Further, high-quality bread for meals can be provided.

[0002] Conventional processes for preparing bread comprise the steps of kneading materials for bread dough, by using a mixer (or a kneading apparatus), fermenting the dough, dividing the fermented dough, molding the divided dough, intermediately proofing the molded dough (bench time), molding the proofed dough, finally proofing the molded dough to give distended dough, and baking the distended dough. One of the main objects of setting up the bench time and performing the final proofing is that the broken network structure of gel, which results from dividing dough of one batch by a mechanical force, or from a mechanical molding of bread dough, is repaired, that the dough is sufficiently fermented to thereby distend, and that, after baking, bread having a sufficient volume is obtained. That is, although, during the preparation of bread dough by kneading materials for the dough, a network structure of gel of wheat gluten protein is formed in the dough to give an elastic body which will distend by baking, the elastic constitution of the dough breaks because of the mechanical force which is applied at the step of dividing the dough of one batch to give dough pieces. Therefore, to repair the broken constitution, the dough must have the bench time under an environment where the dough can ferment. Also, in the molding step, the network structure of gel is broken by the mechanical force. Therefore, to repair the broken network structure, another fermentation step (the final proofing) has been provided in the conventional processes. Alternatively, a dough improver such as potassium bromate must be previously added to the dough.

[0003] The object of the present invention is to provide a simple process for preparing bread in which the intermediate proofing step or the final proofing step or both can be eliminated and no dough improver is needed.

[0004] According to the process of the present invention, the network structure of gel in bread dough is not injured. Specifically, in the process of the present invention, a fermented bread dough passes through a space within a pressing apparatus while being pressed and being gradually conveyed downstream. Thus, it can be stretched and molded to give a belt-like form without the network structure being injured. As examples of prior proposals in which it was tried to stretch fermented bread dough without injuring the network structure, those disclosed in US-A-4,946,699 and US-A-5,091,202, and EP-A1-0744126 can be cited. That is, US-A-4,946,699 discloses a method of producing bread from preserved dough in which the dough is stretched while being subjected to vibrations. US-A-5,091,202 discloses a method of producing a continuous belt-like sheet of bread dough in which the dough in a hopper is downwardly conveyed by vertical conveyors which face oppositely. Further, EP-A-0744126 discloses a method of feeding dough in which at least one horizontally opposed pair of rotatable feeding means that are positioned below the hopper and between which the dough passes move so that the distance between the pair or pairs of such means increases and decreases, repeatedly. However, none of these discloses a process of preparing bread according to the present invention, in which a pressing means is used for repeatedly pressing fermented dough to stretch the dough, and the stretched dough is cut to give dough pieces, which dough pieces can be baked without an intermediate or final fermentation step, or both.

[0005] While in the conventional bread preparation processes an intermediate proofing step or a final proofing step, or both, are needed as discussed above, in the present invention those steps can be eliminated. Thus, the processing time from the start of the dough preparation to the baking of the dough can be very greatly shortened. Further, according to the present invention, excellent bread can be obtained. Specifically, since the intermediate proofing step or the final proofing step, or both, are eliminated (i.e. there are only one or two fermentation steps), not only bread having a favourable taste can be baked, but also the processing time and costs can be largely reduced.

[0006] Thus according to the present invention there is provided a process of preparing bread, comprising the steps of:

(1) providing a pressing means comprising a pressing element and an element that is opposed to and spaced apart from said pressing element,
(2) feeding fermented dough into a space between said pressing element and said element,
(3) repeatedly pressing said fermented dough by alternately and repeatedly decreasing and increasing the distance between said pressing element and said element to give a belt-form dough, and
(4) cutting said belt-form dough to give pieces having a predetermined size, which pieces can be baked without a proofing step.

[0007] Preferably, the said element that is opposed to and spaced apart from the said pressing element is also a pressing element.

[0008] The fermented dough is desirably pressed by swinging the pressing elements.

[0009] The said pressing elements are preferably a pair of roller groups, each of which includes a plurality of rollers that are vertically arranged, each roller being capable of rotating so that said belt-form dough is sent downward.

[0010] Said pressing means is generally arranged below a hopper, said pair of roller groups being arranged in a V-like shape with the lowermost rollers closest to each other.

[0011] The circumferential speed of each roller is desirably changeable.

[0012] For performing a preferred process of the present invention, first, a kneaded dough is made by kneading materials for bread dough having a conventional formation in any known kneading apparatus. Next, this dough is left to stand in storage in an environment in which a suitable temperature is retained. Thus, the dough is fermented and is made to contain sufficient gases therein. This fermented dough receives periodic pressure by a means for applying the pressure (i.e., by the pressing means). By repeatedly receiving the pressure the dough can be molded into a thin layer form (or a belt-like shape) having an elasticity, since the means for applying pressure hinders any increase in the stress inside the dough and does not break the network structure of gel. The dough is cut to be a predetermined size and form, or further molded. The dough pieces thus obtained can be immediately baked.

[0013] In practising the present invention, the fermented dough that is obtained by kneading materials for bread dough and then fermenting the dough in an environment in which a suitable temperature is retained receives periodic pressure by a means for applying the pressure. The means repeatedly decreases and increases the thickness of the dough being processed by applying and releasing the pressure to and from the dough. That is, the dough repeatedly receives pressure by the pressing means. The dough is gradually and continuously discharged from a pressing apparatus and takes a thin layer form such as a belt-like shape. This dough having a thin layer form is cut to give dough pieces having a predetermined form. These dough pieces retain sufficient gases therein. Therefore, they can be immediately baked without being fermented again, to give high-quality bread.

[0014] According to the process of the present invention, the final fermentation step, which has always been performed after the final molding of dough and before baking, can be eliminated. Further, the intermediate fermentation step may also be eliminated. Thus, the process can be shortened as compared to conventional processes for preparing bread. Further, in the present invention, the necessity for using a chemical improver can be reduced.

[0015] An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:-

Figure 1 is a vertical longitudinal sectional view of a kneading apparatus; and
Figure 2 is a side view of an apparatus for carrying out a process according to the present invention.

[0016] Figure 1 shows a conventional kneading apparatus M. It also shows a dough box 11 as a storage container 10 in which kneaded dough D1, which is prepared by the apparatus M, is stored and left to stand.

[0017] For fermentation, the dough box 11, which contains the dough D1, is placed in a heat-retaining room in which the temperature is set to be within a predetermined temperature range that is suitable for fermentation. Alternatively, the dough box 11 may be placed on a floor, when the entire bread preparation line is placed in a room in which a suitable temperature is set. When the temperature in the room in which the entire bread preparation line is placed is suitable for fermentation, the time for the dough to stand at rest and to be left in the dough box 11 may be shortened, since the room acts as heat-retaining storage. In this case, the dough may be fermented while being repeatedly pressed in the next step, which will be explained below. That is, the dough to be processed may not necessarily be fully fermented. Also, when the temperature of the apparatus which is to be used in the next step is controlled within a temperature range that is suitable for fermentation, the dough may not necessarily be fully fermented.

[0018] Referring now to Figure 2, fermented dough D2 is put into a hopper 19. There is a pressing apparatus 20, which acts as a pressing means, located below the lower opening of the hopper 19. The pressing apparatus 20 comprises a pair of roller groups 20L and 20R. These are oppositely arranged in a V-like shape with the lowermost rollers closest to each other. The roller groups 20L and 20R include four rollers 22L and four rollers 22R, respectively. The roller groups 20L and 20R apply pressure to the fermented dough D2 by repeatedly pressing it. Simultaneously, by rotating the rollers 22L and 22R (wherein the rollers 22L in the roller group 20L and the rollers 22R in the roller group 20R rotate in opposite directions, as shown by arrows b), the fermented dough D2 is sent downward while being molded into a belt-like shape.

[0019] The roller group 20L comprises a roller-supporting member 21L and a plurality of pressing rollers 22L, which are vertically arranged. The roller supporting member 21L comprises a swing arm 24L, to which the pressing rollers 22L are attached. Similarly, the roller group 20R comprises a roller supporting member 21R and a plurality of pressing rollers 22R, which are vertically arranged. The roller supporting member 21R comprises a swing arm 24R, to which the pressing rollers 22R are attached. The plurality of pressing rollers 22L and 22R rotate in the direction in which the dough D2 is urged downwardly, which direction is shown by arrows b. The rollers 22L and 22R are rotated by motors 23L and 23R, respectively. The pairs of rollers 22L, 22R are opposed to and synchronized with each other. The circumferential speeds of the plurality of pressing rollers can be suitably selected considering the condition of the fermented dough D2 that is supplied. For example, the uppermost roller has the slowest speed, the second roll-

er has a speed faster than that of the uppermost roller, the third roller has a speed faster than that of the second roller, and the lowermost roller has the fastest speed. Instead, in some cases the uppermost roller has the fastest speed. The circumferential speed of each roller is preferably changeable.

[0020] To facilitate the discharge of the belt-form dough D3 from the space between the roller groups 20L and 20R at their lowest portions (i.e., at the portion from which the dough D3 is discharged), the roller-supporting member 21R in the roller group 20R is constituted so that the supporting member 21R can swing to and from the roller-supporting member 21L in the roller group 20L, in which the fulcrum for swinging is the upper end of the swing arm 21R. To swing the roller-supporting member 21R, it is linked through a coupling link 27 to a circular driving link 26, which is driven by a motor 25 for swinging. The motor 25 is placed on a suitable part of a frame 2 of the pressing apparatus 20. Similarly, the roller-supporting member 21L in the roller group 20L is constituted so that the supporting member 21L can swing to and from the roller-supporting member 21R in the roller group 20R, in which the fulcrum for swinging is the upper end of the swing arm 24L. To control the swinging of the roller-supporting member 21L, it is linked through a coupling link 30 to a circular driving link: 28, which link 28 is rotated by a motor 29, which controls the distance between the roller groups 20L and 20R at their lowest portions. The motor 29 is also placed on a suitable part of a frame 2 of the pressing apparatus 20. An example of the motors 25, 29 is a servomotor.

[0021] Below the pair of roller groups 20L and 20R there is a conveyer 31 for conveying the dough D3 which has been discharged from the pressing apparatus 20 and which has a belt-like shape. A pair of gauge rollers 32,32 are downstream of and adjacent to the conveyor 31. A conveyor 33 is downstream of the gauge rollers 32,32. A cutter 34 is above the conveyor 33. The cutter 34 cuts the belt-like dough D3 to give dough pieces D4 having a predetermined size.

[0022] The pressing means need not always comprise a pair of roller groups 20L and 20R. For example, one element of the pressing means can be made of a plate and the other element can be constituted by a roller group. Both elements can move and can cause the distance between them to change. Alternatively, only the one element that is constituted by a roller group can be made to move, and it alone can cause the distance between the elements to change. Further, one element of the pressing means may be a conveyor belt.

[0023] The pair of the roller groups 20L and 20R do not necessarily form a V-like shape with the lowermost rollers closest to each other. They may be arranged in parallel. They do not necessarily swing. They may press the dough D2 in a parallel arrangement.

[0024] Although in Figure 2 the pressing rollers 22L, 22R have a circular cross section, the cross section form is not limited to a circular form. For example, their cross-sectional form may be polygonal, or polygonal with rounded corners, or with concave or convex portions. The cross-sectional form of the rollers may be selected according to the properties of the fermented dough D2.

[0025] The fermented dough D2 is not always discharged in a vertical direction from a hopper or a pressing means. For example, the dough D2 can be discharged from the lower end of the hopper and brought in an oblique direction. When the dough D2 runs in an oblique direction, it is repeatedly pressed by the pressing means, which is arranged above and under the dough D2, while the dough D2 or processed dough 03 is sent downstream. Alternatively, the fermented dough D2 may be horizontally stretched by being repeatedly pressed by the pressing means, which is arranged above and under the dough D2. In these cases, the element which is arranged under the dough D2 may be a conveyor belt.

[0026] If surfaces which were formed by cutting the dough D3 with the cutter 34 are treated to be sealed, dough pieces D4 will expand more than otherwise, since the gas within them is hindered from escaping. To prevent the exposure of surfaces that were made by cutting the dough D3, with the cutter 34 a member having an obtuse angle may be used. The members are arranged on both sides of the cutter 34 and crush both ends of the dough pieces D4.

[0027] Next, a specific example of the process of the present invention will be described.

[0028] A kneaded dough D1 was left to stand for 90 minutes (a floor time) in a room kept at a temperature of 26°C to give fermented dough D2. The dough D2 was fed into a hopper 19. The dough D2 was repeatedly pressed by a pressing apparatus 20. From the space between the lowest two rollers of the pressing rollers 22L and 22R, a processed dough D3 was discharged while being molded, to have a thickness of 25 mm. By passing the dough D3 through the gap between gauge rollers 32,32, the increase of the thickness of the dough D3 by its elasticity was controlled so that the dough D3 was molded to have a belt-like shape and a thickness of about 25 mm. This dough D3 was cut to give rectangular dough pieces D4 having a size of 200 mm x 70 mm x 25 mm. These dough pieces D4 were placed on a plate and baked in an oven at about 200 °C for 35 minutes. Thus, French bread (baguette) having a satisfactory volume was obtained.

[0029] Likewise, various types of French bread other than baguette, rye bread, and chapati (capati), having high qualities, and the like, can be obtained.

Claims

1. A process of preparing bread, comprising the steps of:

   (1) providing a pressing means comprising a

pressing element (20L) and an element (20R) that is opposed to and spaced apart from said pressing element,

(2) feeding fermented dough (D2) into a space between said pressing element and said element,

(3) repeatedly pressing said fermented dough by alternately and repeatedly decreasing and increasing the distance between said pressing element and said element to give a belt-form dough (D3), and

(4) cutting said belt-form dough to give pieces (D4) having a predetermined size, which pieces can be baked without a proofing step.

2. The process of claim 1, in which said element (20R) that is opposed to and spaced apart from said pressing element (20L) is also a pressing element.

3. The process of claim 2, in which said fermented dough (D2) is pressed by swinging the pressing elements (20L, 20R).

4. The process of claim 2 or 3, in which said pressing elements are a pair of roller groups (20L, 20R), each of which includes a plurality of rollers (22L, 22R) that are vertically arranged, each roller being capable of rotating so that said belt-form dough is sent downward.

5. The process of claim 4, in which said pressing means is arranged below a hopper (19), said pair of roller groups (20L, 20R) being arranged in a V-like shape with the lowermost rollers closest to each other.

6. The process of claim 4 or 5, in which the circumferential speed of each roller is changeable.

Fig. 1

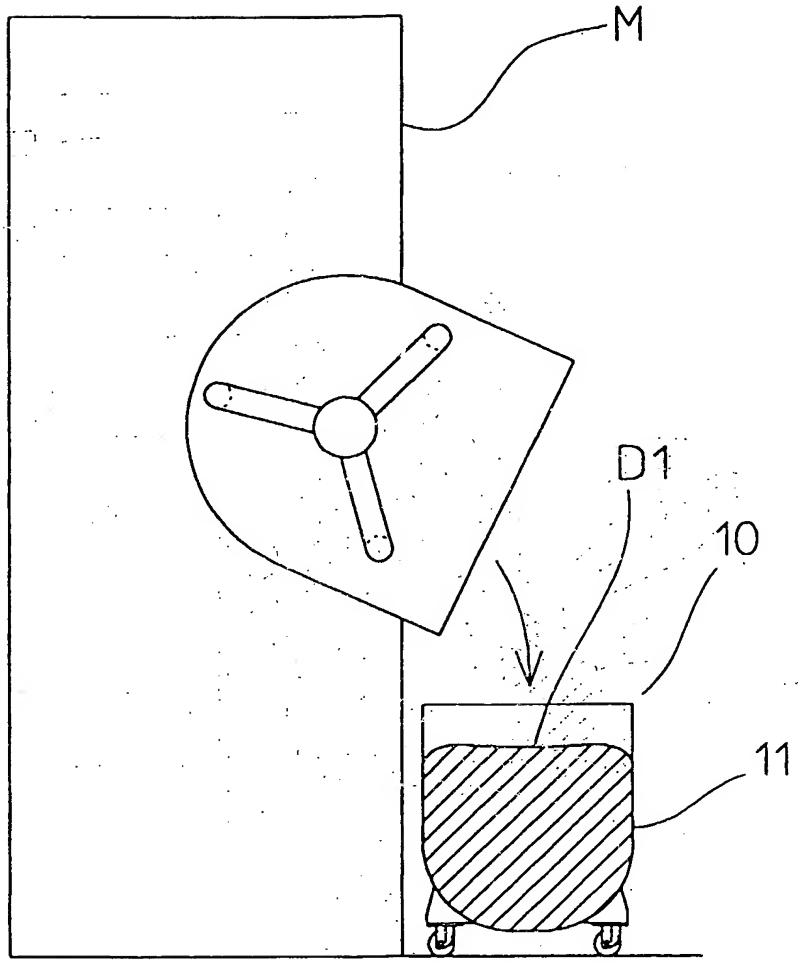
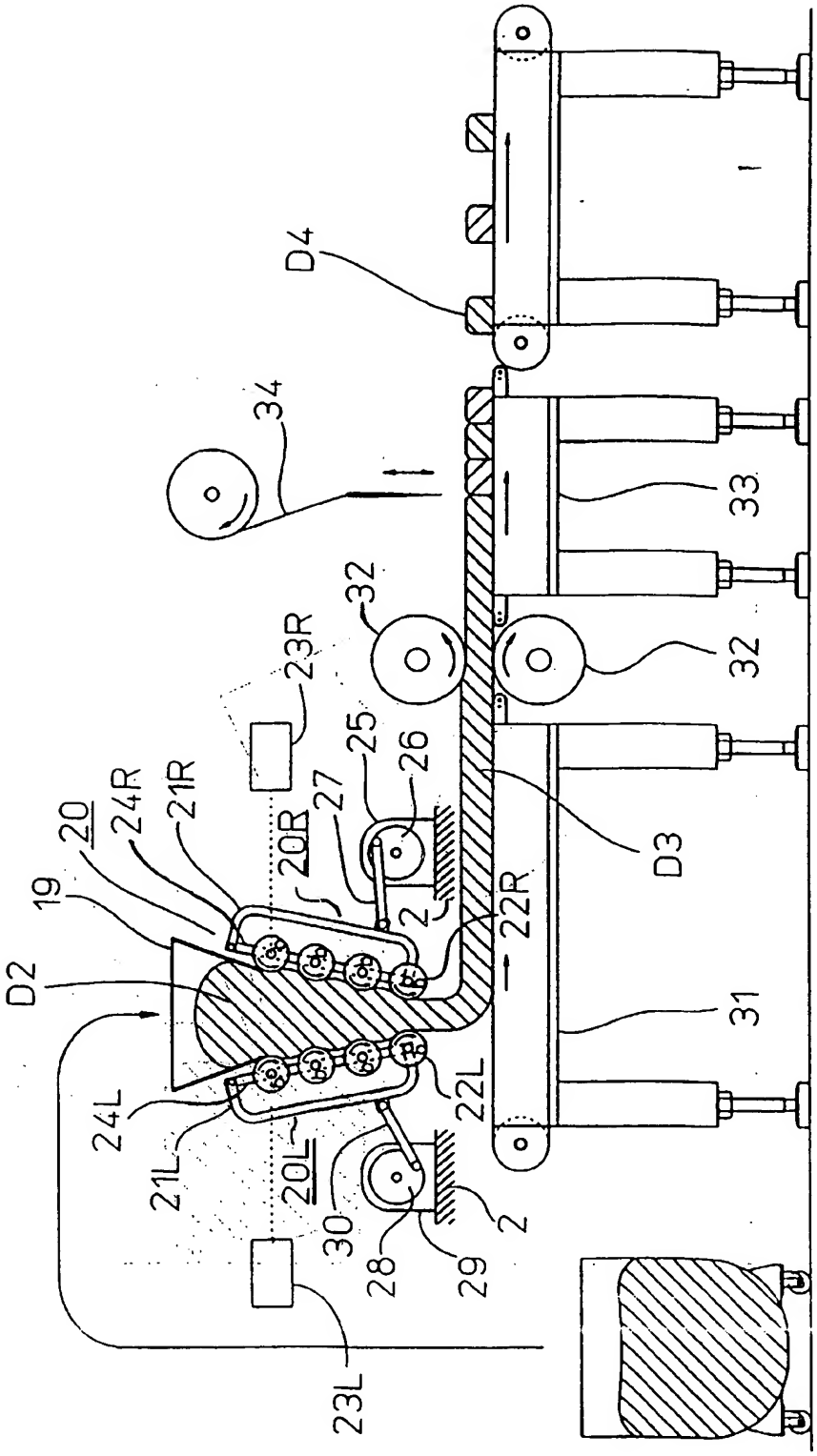


Fig. 2


D4
34
33
32
32
23R
25
26
27
24R
21R
20
20R
19
D2
D3
22R
31
24L
21L
20L
22L
30
28
29
2
2
23L

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(54) Process of preparing bread

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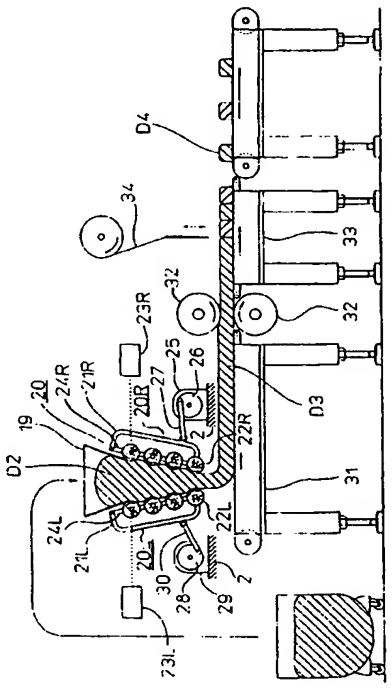
Fig. 2



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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 January 2000	Silvis, H

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